ELECTRONIC DEVICE AND METHOD IN AN ELECTRONIC DEVICE FOR PROCESSING IMAGE DATA

[0001] The present invention relates to an electronic device for performing imaging, including

[0002] camera means for forming image data from an imaging target, the imaging target including at least one primary image object and at least one secondary image object,

[0003] an image-processing chain arranged in connection with the camera means, for processing the image data formed from the imaging target, and

[0004] focussing means for focussing the camera means on at least one primary image object.

[0005] In addition, the invention also relates to a corresponding method, program product, and focussing module, for implementing the invention.

[0006] In small digital cameras, the depth of field is relatively wide, due to, among other factors, their short focal length. One example of this group of cameras is mobile stations equipped with a digital imaging capability. The great depth of field makes it difficult to create a blurred background in the image. One example of such an imaging application is portraits. In them, it is only the primary image object that is desired to be shown sharply, the background, i.e. the secondary image objects, being desired to be blurred.

[0007] Solutions are known from the prior art, in which a shallow depth of field is implemented by using a large aperture (small F-number) and a long focal length. This arrangement is known, for example, from SLR (Single Lens Reflex) cameras. Another possibility is blurring implemented by post-editing. This is a common functionality, for example, in still-image editors. US patent publication US-2002/0191100 A1 (Casio Computer Co. Ltd.) discloses one background-blurring method performed in a camera device in connection with imaging. It is based on capturing two images at the moment of imaging. The first image is focussed on the primary image object and before the second image is captured the focussing is altered to either the close or distant setting. After taking the shots, the first and second images are synthesized with each other. As a result of the synthesizing, a final image is obtained, in which the object is imaged sharply while the background is blurred.

[0008] Some other prior arts applying two or several images describe US 2002/0140623 A1, US 2002/0060739 A1, US 2003/0071905 A1 and US 2002/0191100 A1.

[0009] The present invention is intended to create a way of blurring non-desired imaging objects in digital imaging. The characteristic features of the electronic device according to the invention are stated in the accompanying claim **1** while the characteristic features of the method are stated in the accompanying claim **9**. In addition, the invention also relates to a corresponding Program product and a focussing module to be fitted for use in the device, the characteristic features of which are stated in the accompanying claims **16** and **22**.

[0010] In the invention, blurring is performed using the information Produced by focussing:

[0011] The invention is particularly suitable for application, for example, in such digital cameras, in which there is wide depth of field. Such cameras are known, for example, from mobile stations. The invention can be applied in both still and video imaging.

[0012] In the invention, the information obtained from focussing of the camera is applied. The One or more image objects in the image in which sharpness is to be retained, and correspondingly the image objects to be blurred, can be decided on the basis of this information. Focussing information is available immediately in the imaging situation, so that its application takes place very smoothly for achieving the purposes of the invention.

[0013] The blurring of inessential image objects can be performed, for example, by using filtering. There can even be precalculated filtering coefficients in the device for filtering, from which the most suitable group of coefficients can be selected for use in each situation. On the other hand, the statistics formed for focussing can be used to calculate the filtering coefficients.

[0014] In the invention, the end user can create a blurring effect in the image surprisingly already in the imaging stage using the camera. Thus, there is no-need at all for a separate post-editing operations that would take place outside the device after the imaging event.

[0015] One of the advantages achieved by the invention is that using small cameras, which generally are precisely those with wide depth of field, an such image can be achieved, in which the primary image object is sharp and the background, or the secondary image objects in general, are blurred or otherwise made unclear.

[0016] The other characteristic features of the invention will become apparent from the accompanying Claims while additional advantages achieved are itemized in the description portion.

[0017] The invention, which is not restricted to the embodiments described in the following, is examined in greater detail with reference to the accompanying figures, in which

[0018] FIG. **1** shows an example in principle of an application of the electronic device according to the invention, as a schematic diagram,

[0019] FIG. **2** shows an example of an application of the program product according to the invention, for implementing blurring in an electronic device in the manner according to the invention,

[0020] FIG. **3** shows an example in principle of the method according to the invention, as a flow diagram, and

[0021] FIG. **4** shows an example of an imaging target, to which the invention is applied.

[0022] FIG. **1** shows an example in principle of an application of the electronic device **10** according to the invention, as a flow diagram, on the basis of which the invention is described in the following. In addition, FIG. **2** shows an example of the program product **30** according to the invention. The program product **30** forms of a storage medium MEM and program code **31** stored on it, with reference to the code means **31.1**-**31.5** belonging to which program code **31** being made at suitable points in the following description, to connect them to the method and device **10** according to the invention.

[0023] The device **10** can be, for example, a digital camera equipped with a still and/or video imaging capability, a digital video camera, a mobile station equipped with a camera, or some other similar smart communicator (PDA), the components of which that are inessential from the point of view of the invention are not described in greater detail in this connection. The invention relates not only to the device **10**, but equally to an imaging-chain system **27** and a focussing module **28**, such as may be, for example, in the